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ABSTRACT

This study had two purposes: to test the usefulness of partial order scalogram analysis with multivariate response data; and to illustrate the multidimensional nature of suicide risk. A detailed introduction describes partial order scalograms, which locate respondents' profiles in a two-dimensional space (rather than on a unidimensional Guttman scale), portraying both quantitative and qualitative variation among profiles. Three groups responded to the Suicide Probability Scale (Cull & Gill, 1982): (1) a normative group from San Antonio, Texas; (2) psychiatric inpatients; (3) persons who had made a potentially lethal suicide attempt in the last 48 hours. Of 1,158 respondents, a stratified sample of 100 profiles was analyzed by the POSAC-I (Partial Order Scalogram Analysis with Base Coordinates) scaling program, a computer program from the Guttman-Lingoes series for portraying partial order relations in a two-dimensional space. A subset of items (7, 24, 25, 30, 32) representing intrapersonal behaviors, derived from the primacy-of-environment facet, yielded a solution with .93 goodness-of-fit. Spatial regions discriminated suicidal and nonsuicidal groups, but did not separate normals from psychiatric patients. There was no typical suicide profile; scalograms showed qualitative heterogeneity of suicide attempters, not evident from total scores alone. Affective expressions of hopelessness and despair and cognitive planning of means were orthogonal dimensions of suicide risk. Numerous figures aid in conveying method and results. (LPG)

THE USE OF PARTIAL ORDER STRUCTURES FOR INVESTIGATING SUICIDAL BEHAVIOR

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Introduction

Inquiries into the nature of suicide, dating back to Durkheim's (1895) classic work entitled Suicide, have motivated an extensive body of theoretical and empirical research for nearly a century. Despite a long history, most suicide research is seriously deficient, providing but a flimsy (Beck, Resnick, & Lettieri, 1974) if not trivial (Arffa, 1983) base of knowledge for understanding suicidal behavior. Very little widely generalizable knowledge has accumulated, and the search for behavioral regularities that characterize suicide has failed to provide insights into its fundamental underlying dynamics.

Traditionally, investigations of suicide risk have followed one of three approaches. The first, dealing with identification of relevant socio/demographic variables, posits a consistent relationship between suicide risk and such factors as age, gender, race, marital status, religious affiliation, years of education, family history, and physical health (Brown & Sheran, 1972). A sizable body of literature supports such statements as white, Protestant males 45 years of age or older, who are living alone or who have been recently separated or divorced are at greater risk for suicide than other men, and that while women are more likely than men to attempt suicide, men die by suicide more frequently. Though the general correspondence between socio/ demographic risk factors and suicide has been demonstrated repeatedly, this nomothetic approach to research is largely atheoretical (Arffa, 1983) and has failed to facilitate prediction of idiographic suicide risk (Brown & Sheran, 1972).

A second approach to research involves identification of clinical signs predictive of suicide. In this vein, the hope of isolating a single, or at most a few, highly specific, reliable clincial indicators of suicide risk has spawned a large body of research focusing on affective and cognitive behaviors. Hostility, loss or threat of loss, and feelings of hopelessness and helplessness are among the affective behaviors receiving considerable attention in the literature. Though ample empirical evidence links these behaviors to suicide risk (Beck, et al., 1974; Shneidman, 1985), none appear unique to suicidal persons and their use as clinical signs produce many "false positives."

Efforts to understand why only some persons given to feelings such as hopelessness and helplessness are vulnerable to suicide have focused attention on investigating cognitive behaviors, especially as they relate to stressful life events. In general, findings suggest that the cognitive processing of suicidal persons differs from that of their nonsuicidal counterparts (Neuringer & Lettieri, 1971; Shneidman, 1985) and that cognition in intra- and interpersonal matters is quite different from the processing that occurs in impersonal matters. Specifically, the primacy of an event, that is, the degree to which it impinges directly on a person's intrapersonal life, contributes to its valence as a stimulus for suicidal behavior, with the valence having a greater effect on suicidal than nonsuicidal persons.

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The third traditional approach to suicide research is characterized by the development and use of attitude measurement instruments. Brown and Sheran (1972) note that while instruments misclassify large numbers of suicidal and nonsuicidal persons alike, attitude measures have the greatest predictive potential of all the methods used to assess suicide risk. In an extensive review of measurement instruments, Lester (1970) concludes that standard psychological tests, including the Rorschach and Minnesota Multiphasic Personality Inventory, generally are not useful clinically for predicting suicide, while instruments devised specifically for measuring suicide risk appear more promising.

Shortcomings also befall these specially designed tests, however, especially in terms of validity and the lack of a theoretical basis for instrument construction. A systematic plan for sampling items from a content universe is glaringly absent and, worse still, is the lack of a reliable, unambiguous definition of suicidal behavior to guide instrument construction. Several reviews of suicide research (Arffa, 1983; Brown & Sheran, 1972; Devries, 1968) unanimously cite the lack of a definitional framework for suicidal behavior as the single greatest impediment to systematic, sophisticated research on the topic.

Difficulties in sampling an appropriate population also plague research. Investigators studying completed suicides must rely on retrospective observations such as suicide notes and the recall of family and friends of the victim. Because of inherent difficulties in obtaining reliable data from these sources, most researchers study nonfatal suicide attempters. Yet, relying on prospective observations from suicidal individuals is problematic as well. Among other things, suicide attempters often are considered a homogeneous population with respect to the degree to which they are at risk for suicide. This untested , and often mistaken, assumption leads researchers to view nonfatal suicide attempters as exhibiting the criterion behavior uniformly when, in fact, variations in expressions of suicide intent represent qualitative as well as quantitative differences among suicidal persons. The failure to consider variations in **degree** and **type** of suicidal behavior tends to produce research findings that are both invalid and contradictory (Arffa, 1983).

Facet Theory and Partial Order Scalogram Analysis

Guttman's facet theory (cf. Borg, 1979; Levy, 1981 for reviews) and, in particular, partial order scalogram analysis (cf. Guttman, 1959; Shye, 1985) facilitate investigations of structural relationships among persons who differ quantitatively and qualitatively with respect to some well defined behavioral universe. Like unidimensional (Guttman) scalogram analysis (cf. Stouffer, Guttman, Suchman, Lazarsfeld, & Star, 1950), partial order scalogram analysis provides a theoretical framework for portraying relationships among profiles in a data matrix--called a scalogram--where rows typically correspond to persons and columns contain item responses. Partial order scalogram analysis extends the concept of a "perfect scale" to a multidimensional model by portraying relationships among all observed profiles, not just those "scale-types" that fit the traditional unidimensional model. The rarity with which empirical data conform to "perfect scales" and the frequency with which nonscale-types occur empirically have motivated a framework for systematically investigating profile types other than those specified by the traditional Guttman model. The notion of partial order from lattice theory, a scheme for classification in abstract algebra, provides a framework for representing similarities and differences among profiles in a systematic and substantively meaningful manner.

The concept of partial order between profiles is straightforward. If all the variables employed in an investigation measure a common construct (e.g., intelligence, involvement in drug use, suicidal behavior), respondents' scores on each variable provide a basis for comparing profiles. A profile, p_a, is said to be greater than another profile, p_b, with respect to the trait being measured if p_a is greater than p_b on at least one variable and equal to p_b on all other variables. Under these conditions, the profiles are said to be comparable and $p_a > p_b$. Alternatively, two profiles, p_a and p_b, are noncomparable if and only if one profile has a higher score on at least one variable while the other profile is greater on at least one other variable. Unidimensionality is the case where all profiles are comparable, while multidimensionality results from noncomparable profiles.

By way of example, consider the profiles listed below for seven persons on four polychotomous variables. In the framework of lattice theory, profiles for persons E, B, D, and A are mutually comparable because $p_e > p_b > p_d > p_a$. On the other hand, profiles of persons G and B are noncomparable since on the first variable $p_g > p_b$ $(3 > 1)$ while on the second variable $p_g < p_b$ $(1 < 3)$.

Person	Profile of Four Scores	Profile Score
A	1111	4
B	1331	8
C	2222	8
D	1221	6
E	3333	12
F	2121	6
G	3131	8

Partial order structures are easily portrayed by a spatial diagram called a lattice where unique profiles are represented by distinct points in space. Two profiles are connected by a line if and only if they are comparable, and the greater of the two profiles is positioned above the lesser. An example of a lattice diagram for the seven profiles listed above is given in Figure 1.

Figure 1 about here

As Figure 1 shows, a lattice diagram rank orders profiles on the basis of "total scores." Profile "3333" with a score of 12 has the highest rank; profile "1111" with a score of 4 is ranked lowest, and all other profiles assume intermediate ranks. The lattice diagram also shows that while several profiles may be associated with a common total score, a single score can be generated by any one of several distinct score patterns. For example, the profiles "1331", "2222", and "3131" all correspond to a score of 8, but each reflects a qualitatively different behavioral response. In general, persons whose profile scores are equivalent must either exhibit identical response patterns, indicating identical manifest behaviors, or the profiles must be noncomparable, depicting qualitatively distinct behaviors. That persons can be qualitatively distinct and noncomparable while having equivalent scores is a fact often overlooked when comparisons among persons are based soley on summary scores. It is precisely these qualitative individual differences that partial order scalogram analysis manifests.

Partial Order Scalogram Analysis with Base Coordinates

Partial Order Scalogram Analysis with Base Coordinates (POSAC-I) is a computer program from the Guttman-Lingoes series (Lingoes, 1973) for portraying partial order relations in a two-dimensional space. The initial sub-routine of POSAC-I makes a listing of the distinct profiles in a data set and records their observed frequency. If the number of unique profiles approaches the number theoretically possible for a set of say N variables, POSAC-I is of no use in determining an underlying structure for the scalogram because N dimensions would be required to portray the multivariate distribution. However, when variables are sampled from some well defined behavioral universe, semantic and statistical relationships often exist among them, reducing the number of observed profiles to a smaller number of unique patterns. In this case, POSAC-I is useful for examining the underlying structure of the observed profiles.

Using a principle components solution of a matrix of weak monotonicity coefficients as a first approximation, POSAC-I represents the distinct profiles in a two-dimensional space which preserves their partial order relationships by, in effect, mapping a lattice diagram onto the 2-space. Because the principle components solution need not yield a unique lattice diagram (Profiles with equivalent total scores can generally occupy any one of several positions in the solution space while still preserving the order relations.), a further restriction called **regionality** is imposed on the solution. Regionality requires that for as many variables as possible, each variable taken one at a time, all profiles with the same "score" on a given variable must be contiguous with one another in the 2-space. In this way, for the maximum possible number of variables, each variable will correspond to a partitioning of the space into contiguous regions, one region for each of a variable's categories. Boundaries demarcating regions are free to take on any shape, and while POSAC-I attempts to establish regions corresponding to the response categories of each variable, some variables may fail to partition the solution space. A goodness-of-fit index , CORREL, represents the proportion of partial order relations correctly represented in the solution given the regionality constraint. When a two-dimensional space is sufficient for portraying partial order relations given this constraint, the resulting structure tends to be unique and substantively meaningful.

POSAC-I output consists of a space diagram and a set of item diagrams corresponding in number to the variables (items) under consideration. Figure 2 illustrates POSAC-I output for the profiles in Figure 1. In the space diagram shown in Figure 2a, each profile is represented as a point labeled by a subject identification number, and the ordering of the points reflects the partial order relations among the profiles. Essentially, the space diagram is a lattice diagram rotated 45 degrees so that profiles having the highest profile scores occupy the northeast quadrant and profiles with the lowest scores fall to the southwest. The northeast-to-southwest direction is called the **joint direction**, and it orders profiles quantitatively according to levels or degree of the behavior under investigation. When a two-dimensional POSAC-I configuration fits the data, all comparable profiles are properly ranked in the joint direction.

Noncomparable profiles are aligned in the direction running northwest-to-southeast, called the **lateral direction**, which corresponds to qualitative differences between the profiles. That the lateral and joint directions are orthogonal reflects the fact that differences in **degree** and **type** are properties of profiles (and of the behaviors they represent) that are free to vary independently of one another.

Figures 2b-2e are item diagrams for four polychotomous items. Item diagrams are identical to the space diagram except that points are labeled differently. In item diagrams, labels represent scores of each profile on each item individually. For example, Figures 2b-2e show that profile B has a score of "1" on items 1 and 4 and a score of "3" on items 2 and 3. The dotted lines are drawn in by the researcher so as to partition each item diagram into contiguous regions corresponding to the item's response categories.

Items whose category boundaries run parallel to the X- and Y-axis (as shown in Figures 2b and 2c) are particularly informative, though they need not be observed for every data set. The semantic components of these items, called X- and Y-base items, depict orthogonal conceptual components that characterize the structure of the scalogram. An example of base items and their meaning is given in the results section below.

Figure 2 about here

To represent a profile's position in the solution space relative to the base items, POSAC-I computes a pair of mathematically optimal base coordinates for each profile in the scalogram. In the sense that each profile in an analysis is associated with a pair of base scores and that the content of the base items gives meaning to the orthogonal axes, POSAC-I is a method of qualitative (ordinal) factor analysis, an idea reflected in the early work of Guttman (1959, 1971) and Coombs (1964; Coombs & Kao, 1955).

Relationship of Partial Order Scalogram Analysis to Traditional Scalogram Analysis

To relate partial order scalogram analysis to its undimensional predecessor, it is helpful to recall the basic premises of the traditional Guttman model. The unidimensional model posited that when the scalability hypothesis held for a set of items from a content universe, the observed "perfect scale" conveyed information about the content area and about quantitative differences among respondents. Specifically, evidence of a perfect scale suggested that the behavioral universe as a whole was scalable, that the universe was cumulative, and that a single variable (rank order) was sufficient for characterizing a multivariate profile without undue loss of information.

In extending these ideas to the two-dimensional case, the same logic applies, namely, that the partial order structure conveys information about the content area and about differences among respondents. With regard to the behavioral universe, the content of items playing X- and Y-base roles in structuring the partially ordered space provide information as to underlying orthogonal conceptual components of the universe. Further, the X- and Y-base coordinates associated with each profile are sufficient for summarizing the information in profiles.

METHOD

Instrument

The measure used in this investigation was the Suicide Probability Scale (SPS; Cull & Gill, 1982). The instrument, a self-report measure designed to assess suicide risk in adolescents and adults, is composed of 36 Likert-type items each having four response alternatives ranging from "None or a little of the time" to "Most or all of the time".

For scoring the SPS, Cull and Gill recommend a scheme for weighting response categories based on a criterion weighting method proposed by Guttman (1941). Because Cull and Gill's empirically derived category weights correlated highly (r = 0.98) with the more traditional unit weights, the present investigation used unit weights, scoring responses from 1 to 4 where a score of 4 represents increased suicide risk.

Data

Data employed in this investigation represented three populations: a normative group, psychiatric inpatients, and individuals who had made a recent potentially lethal suicide attempt. The normative sample consisted of 562 individuals (342 females and 220 males) randomly selected from the general population of the San Antonio, Texas area who reported never having made a serious suicide attempt and having no psychiatric history. The psychiatric inpatient group consisted of 260 persons (173 females and 87 males) having no previous history of a suicide attempt and who were administered the SPS as part of a test battery during their hospital stay. The sample of suicide attempters consisted of 336 individuals (236 females and 100 males) who were administered the SPS within 48 hours of making a potentially lethal suicide attempt such as a serious drug overdose, deep slashing of the wrist, or a self-inflicted gunshot wound in the head.

Three methodological concerns that characteristically plague suicide research were controlled for with this data set: 1) variations in intentionality to commit suicide as evidenced by the lethality of the method employed, 2) variations in the amount of time lapsed between a suicide attempt and observation of behavior, and 3) use of psychiatrically disturbed individuals as a substitute for a suicide sample under the untested assumption that inpatients represent the criterion population.

Analysis

Sets of profile data were submitted to POSAC-I, each set consisting of 100 profiles selected randomly and without replacement from the larger data file so as to form stratified samples composed of 35 normal, 30 psychiatric, and 35 suicidal individuals. (The entire set of 1158 profiles was not analyzed as a whole because of an operating constraint on the local implementation of POSAC-I.)

Initially, profile data based on responses of the stratified sample to all 36 SPS items were submitted for analysis. The partial order structure of the profiles was found far too complex for adequate representation in two dimensions as evidenced by an unacceptably low value of the goodness-of-fit index (CORREL = 0.48, indicating that fewer than half of the partial order relations among the profiles were represented correctly).

Guttman (1982) notes that the dimensionality of a scalogram is tied to restricting the domain of the behavioral universe. To select a subset of items with a suitably restricted domain, the multidimensional structure of the SPS was considered. In an investigation of the structure of the SPS within the context of nonmetric multidimensional scaling and facet analysis, several semantic components of the SPS were found to correspond to the correlational structure of the measure (Dancer, 1986). One of these components, called a primacy-of-environment facet, involved classifying the SPS items according to whether they measured intrapersonal behavior (e.g., Item 21, "...the world is not worth continuing to live in."), interpersonal behavior (e.g., Item 23, "...I don't have any friends I can count on."), or behavior with regard to one's resources (e.g., Item 31, "I worry about money."). These categories were considered ordered in the sense

that intrapersonal behavior, moreso than behavior relative to one's resources, was thought to have greater primacy in determining suicide risk. Figure 3 shows a schematic representation of the SPS in terms of several semantic components that contribute to the multidimensional structure of the measure. The primacy-of-environment facet corresponds to the concentric regions of the conical representation.

Figure 3 about here

For subsequent POSAC-I analyses, the domain was restricted by selecting items that measured intrapersonal behavior only. Hence, profiles based on Items 7 , 24, 25, 30, and 32 were submitted for analysis. Again, 100 profiles forming a stratified sample of the larger data set were selected.

RESULTS

Scalogram Analysis Based on SPS Items 7, 24, 25, 30, 32

Of the 100 profiles, 48 were observed to have the response string "11111" and four other profiles had frequencies ranging from three to six. All other profiles were observed only once. As a consequence of the pronounced homogeneity of the sample, only 38 distinct profiles were observed, and these were readily located in the two-dimensional space (CORREL = 0.93). A list of the unique profiles, their frequency, the associated score, and the identification number for each are shown in Table 1.

Table 1 about here

The space diagram from the POSAC-I solution is shown in Figure 4a. Profile 66, located in the northeast corner of the space, is the response string "44444" and represents the greatest degree of suicide risk. The lowest degree is portrayed by profile 1 (with the response string "11111") in the southwest corner. The direction of the diagonal from profile 66 to profile 1 represents the joint direction of the solution space and defines varying levels of suicide risk. For example, profiles 53 and 85 exhibit intermediate levels of risk with profile 53 showing less risk than profile 85. Profiles 2 ("11222") and 12 ("12212"), on the other hand, exhibit equivalent levels of suicide risk (since both have a score of 8) but differ in **type** of risk as indicated by their positions along the lateral direction.

In the space diagram, profiles numbered 1 through 35 were observations on normal respondents, profiles 36 through 65 corresponded to psychiatric inpatients, and profiles 66 through 100 were suicide attempters. To examine the usefulness of the partial order structure for discriminating between suicidal and nonsuicidal respondents, the profiles were coded according to group membership--normative, psychiatric inpatient, and suicide attempter. As shown in Figure 4b, distinct regions corresponding to profiles of suicidal and nonsuicidal persons could be identified in the space diagram, but separate regions were not observed for the normal and psychiatric samples. The region defined by suicidal persons contained a single misclassification, a profile for a psychiatric inpatient, while the region corresponding to the nonsuicidal sample contained profiles for three suicide attempters.

Figure 4b also shows the relative diversity of the suicidal and nonsuicidal groups. Within the region for suicide attempters, the number of profiles and the density of their distribution graphically portrays the heterogeneity of this group. With the exception of profiles 66 and 53, no two suicide attempters responded identically to the five SPS items. In contrast, among the 35 normal respondents, only six unique profiles were observed.

The role played by each of the five "intrapersonal" items in structuring the partially ordered space can be seen from their item diagrams . As shown in Figures 4d and 4e, Item 24 ("...people would be better off if I were dead.") and Item 25 ("...it would be less painful to die than to keep living the way things are.") were found to be X-base items. It is not surprising that these items played identical roles in strucutring the solution space since they are quite similar in content. Item 30 ("I have thought of how to do myself in.") was a Y-base item, as shown in Figure 4f. Superimposing each of these item diagrams on the space diagram shows that high scores on any one of the base items corresponds to profiles in the suicide region. Specifically, profiles having an observed score of 3 or 4 on at least one base item correspond to suicidal persons. For example, profile 76 is that of a suicide attempter with low scores of "1" and "2" on Items 30 and 24, respectively, and a high score of "4" on Item 25.

The key to understanding a partial order structure rests in relating the X- and Y-direction of the solution space to the semantic structure of the base items. The present POSAC-I analysis suggests that affective expressions of hopelessness and despair embodied by Items 24 and 25 typify one category of suicidal persons, while cognitive behaviors such as thinking of how to do oneself in (Item 30) underlie a categorically different suicidal individual. Moreover, because these two components of suicide are orthogonal, a person at risk can have a plan for doing him or herself in without feeling hopeless about life, or a person who feels quite hopeless but has no plan for ending life can be just as much at risk. While persons with extreme scores on any base item are at risk for suicide, so too are persons who express intermediate levels of both behaviors.

The diagram for Item 32 ("I think of suicide."), shown in Figure 4g, suggests this item plays a joint role in the solution because it partitions the space into regions aligned in the joint direction. The joint role implies that the higher a respondent's score on this single item, the higher will be his or her overall profile score and that if only one item could be administered, the "best" item, in the sense of predicting the total score, would be an item playing the joint role.

As shown in Figure 4c, Item 7 ("In order to punish others I think of suicide.") plays a role different from the other items, partitioning the item diagram into L-shaped regions. This regionality reveals **similarities** between noncomparable profiles, that is, profiles spread in the lateral direction. For example, profiles 83 and 100 represent different types of suicide risk by virtue of being located on opposite ends of the lateral direction, but they exhibit similar attitudes regarding suicide as a means of punishing others. Figure 4c also shows that some, but not all, suicidal individuals score high on Item 7. Thus, Item 7 differentiates two types of suicidal persons--those who contemplate suicide as a punitive act and those who consider suicide for other reasons.

Figure 4 about here

Other Scalogram Analyses

In addition to the analysis discussed above, several scalogram analyses were conducted on other subsets of SPS items. Many of these analyses yielded uninterpretable results or results that were ill-fitted to a two-dimensional space. This finding is not a comment on partial order scalogram analysis as a procedure. Rather, it evidences the difficulty involved in identifying subsets of variables that yield meaningful partial order structures for complex behavioral universes, as is suicidal behavior, and for populations that are quite heterogeneous with respect to the behavior under investigation.

DISCUSSION

This research investigated the usefulness of the concept of partial order for classifying persons on the basis of multivariate profile data. Additionally, a correspondence between the partial order of persons on the basis of their responses to the SPS items and their classification according to the categories of normality group, psychiatric inpatient, and suicide attempter was investigated. The technique of partial order scalogram analysis, a multidimensional extension of the "perfect" (Guttman) scale, was used.

Findings from this research provide empirical evidence of the usefulness of partial order relations for classifying persons in terms of the degree and type of their suicidal behavior. The partial ordering of profile data resulted in a two-dimensional configuration that rank ordered respondents according to degree of suicidal behavior while simultaneously portraying systematic qualitative differences among respondents. The structure of the partial order configuration suggests that feelings of hopelessness and despair and thoughts of "doing oneself in" are orthogonal components of suicide risk. Additionally, the partial ordering of respondents was found to correspond to classifications of persons according to group membership. This correspondence served as empirical evidence of the usefulness of scores from a subset of SPS items for discriminating between suicidal and nonsuicidal persons, and it called attention to the glaring diversity of types of suicidal behavior, a fact that cannot be readily observed from more traditional methods of analysis of "total scores."

For a number of subsets of SPS items, the partial order structure was not interpretable. Two reasons for this occurrence seem plausible. First, the distinct combinations of responses to the subsets in question were so numerous that they could not be portrayed accurately in a two-dimensional space. Second, the multivariate responses of suicidal persons were so varied in comparison to those of the normal and psychiatric groups that the number of distinct profiles for this group alone often did not lend itself to representation in a two-dimensional space.

Despite some difficulties associated with the use of POSAC-1, evidence from this research suggesting that affective (hopeless and depair) and cognitive (planning to end one's life) behaviors are orthogonal components of suicide risk and that suicidal persons express their behavior in such varied ways is of value. The orthogonality of affective and cognitive behaviors is congruent with the frequently observed phenomena that for some distressed persons suicide is an impulsive act with seemingly little forethought, while for others suicide seems to be a carefully planned act even though the person shows no signs of depression or hopelessness. Evidence of the diversity of expressions of suicidal behavior supports the view long held by a minority of researchers that suicide is not a unitary phenomenon and that repeated attempts to construct a profile that characterizes the "typical" suicidal person are to no avail.

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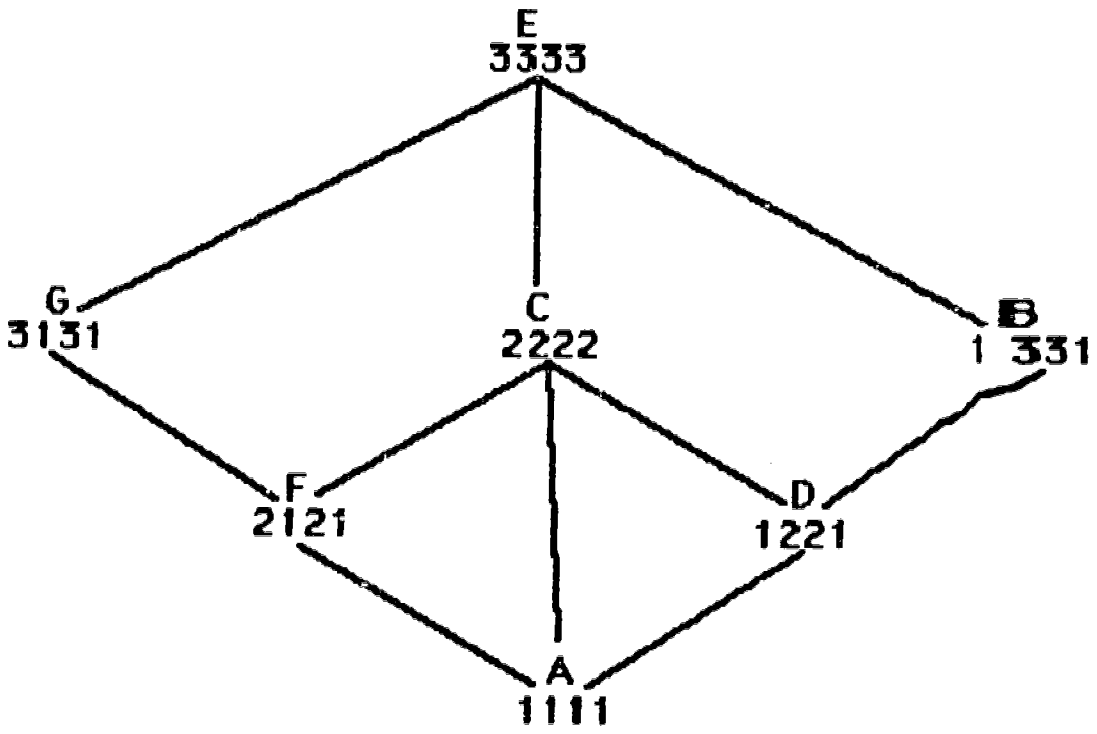


Figure 1. Lattice diagram for seven profiles

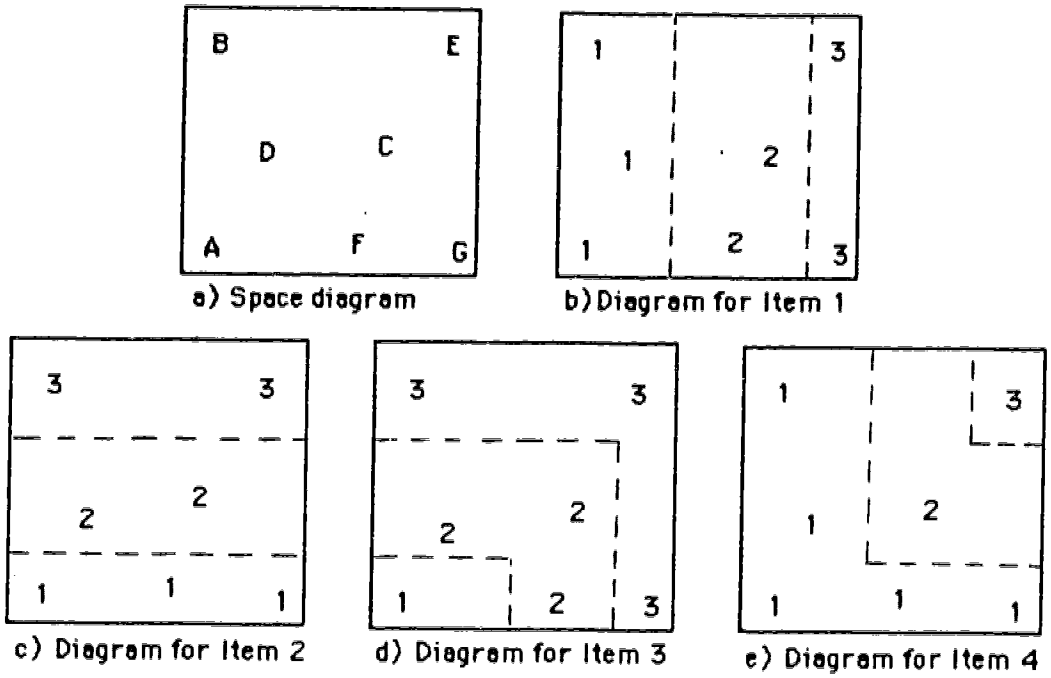


Figure 2. Example of POSAC space diagram and item diagrams

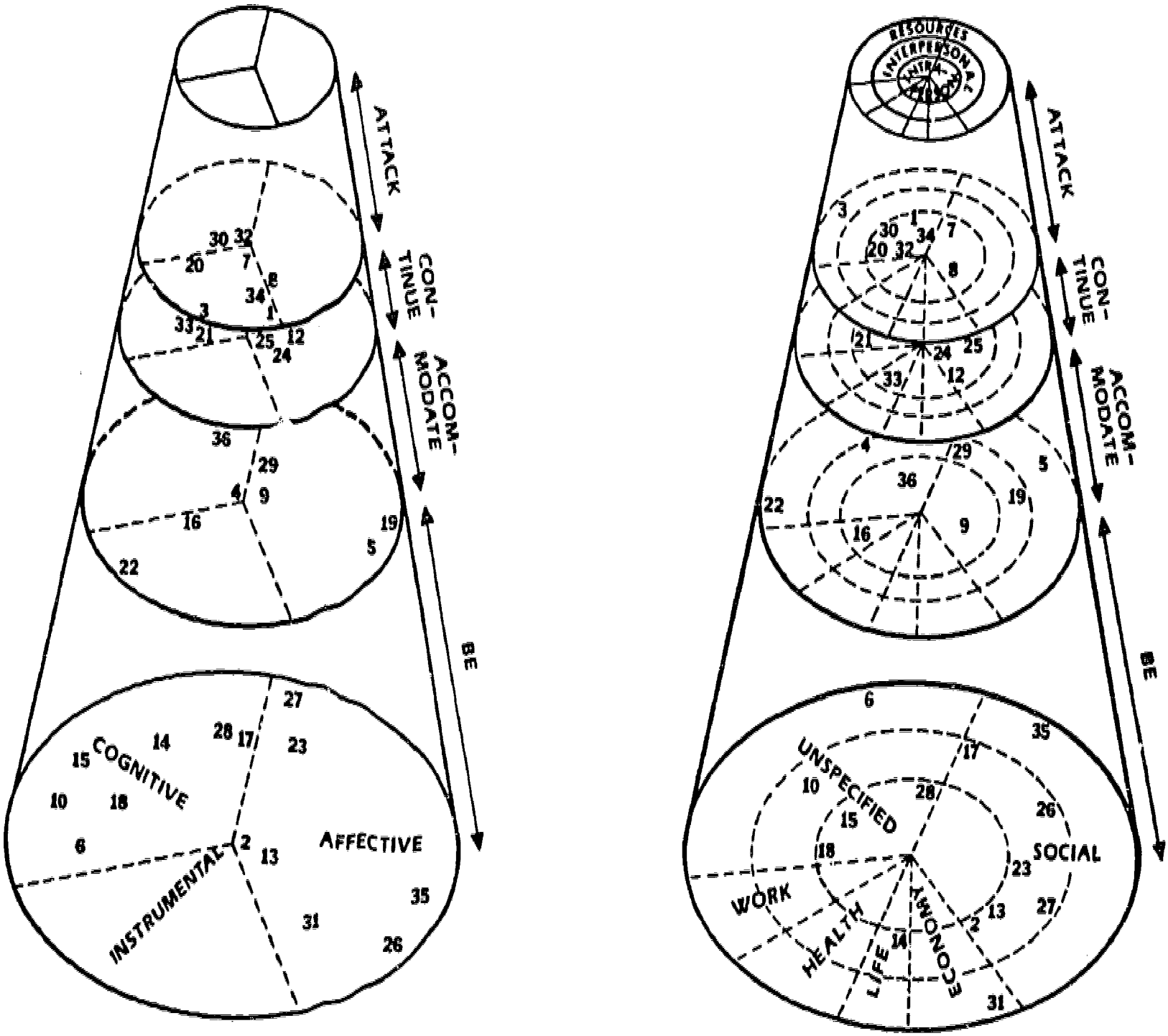
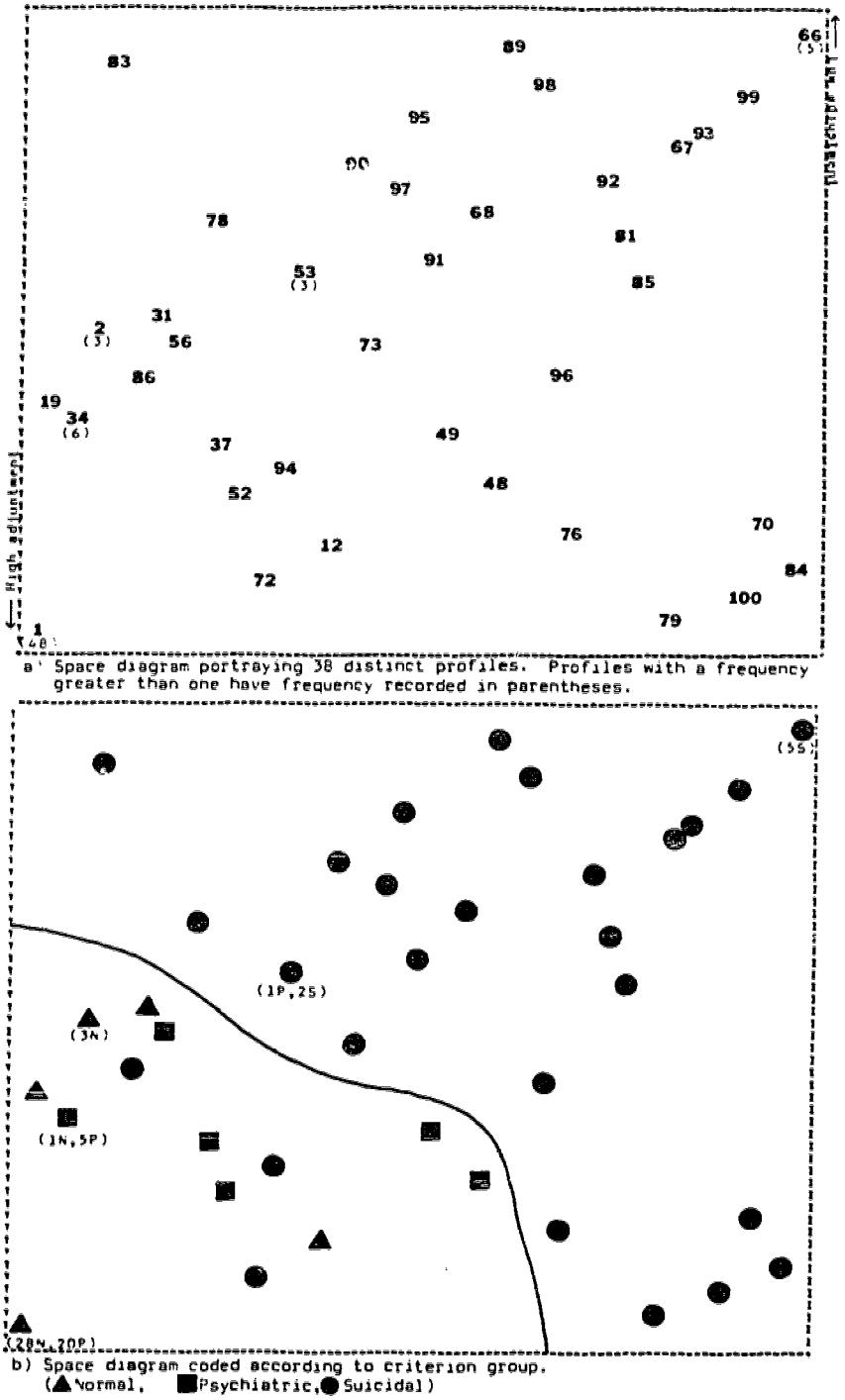


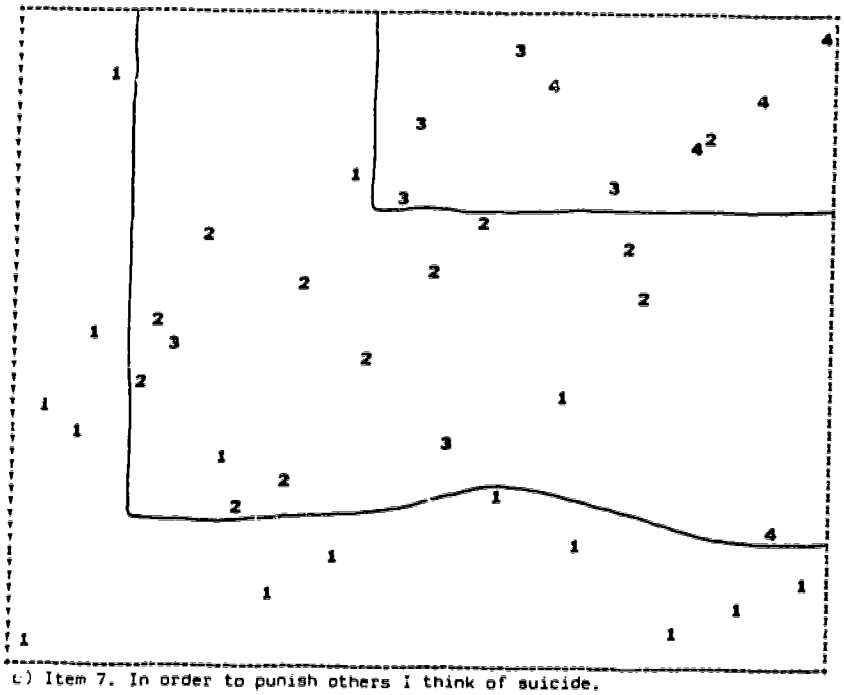
Figure 3. Schematic representation of the structure of the Suicide Probability Scale on the basis of nonmetric multidimensional scaling. (Numbering of the points corresponds to that of the SPS items.)



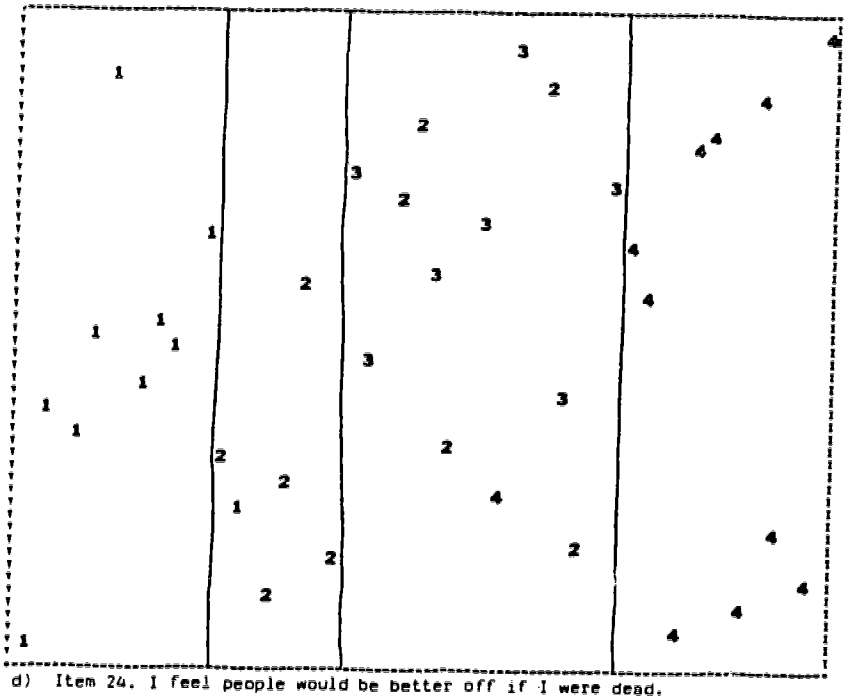
a) Space diagram portraying 38 distinct profiles. Profiles with a frequency greater than one have frequency recorded in parentheses.

b) Space diagram coded according to criterion group. (▲Normal, ■Psychiatric, ●Suicidal)

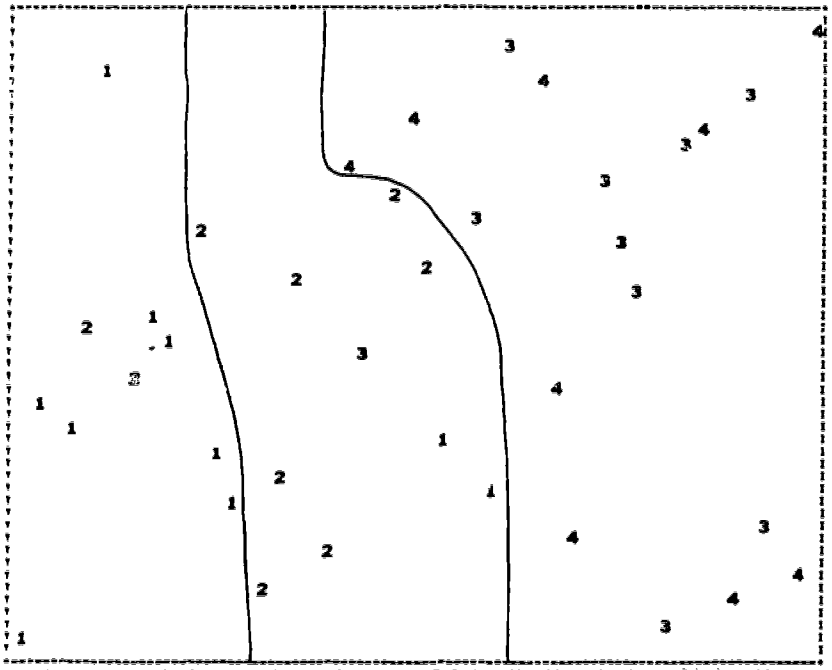
Figure 4 . Space diagram (a,b) and item diagrams (c-g) from Partial Order Scalogram Analysis of Suicide Probability Scale Items 7, 24, 25, 30, and 32.



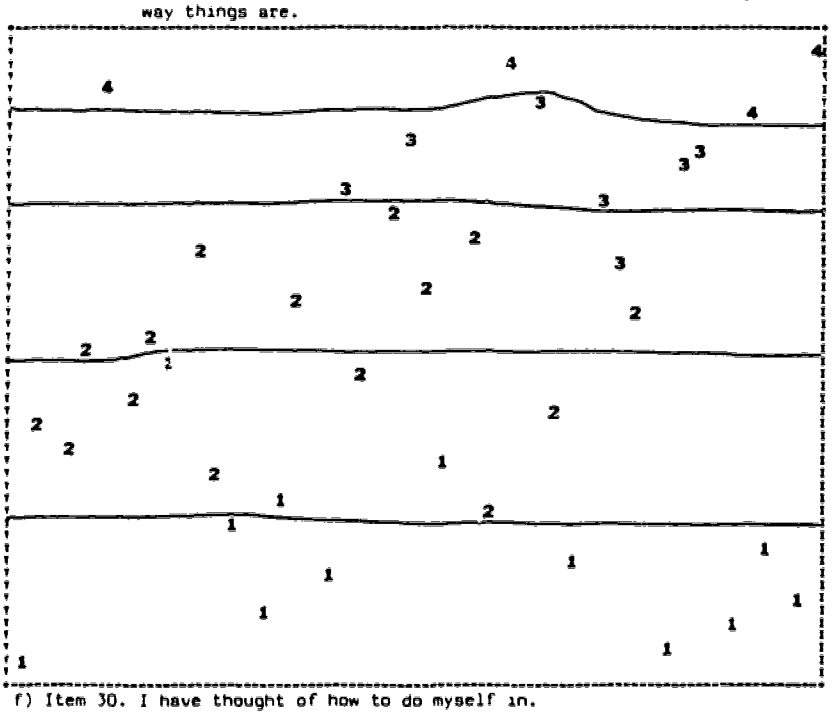
c) Item 7. In order to punish others I think of suicide.



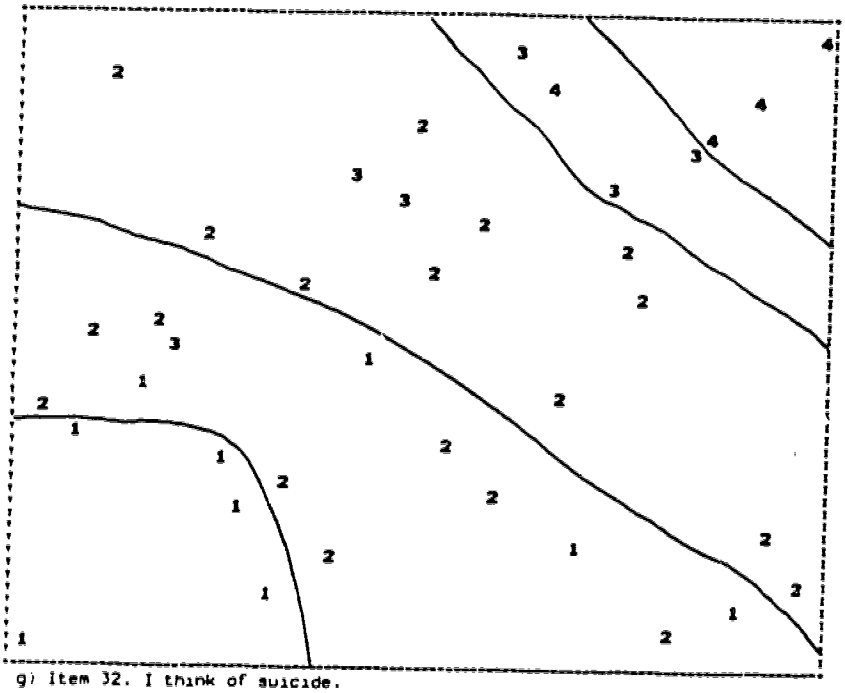
d) Item 24. I feel people would be better off if I were dead.



e) Item 25. I feel it would be less painful to die than to keep living the way things are.



f) Item 30. I have thought of how to do myself in.



g) Item 32. I think of suicide.

Table 1

Profiles Observed for Normal, Psychiatric, and Suicidal Persons in Response to Suicide Probability Scale Items 7, 24, 25, 30, and 32

Profile ID Number	Profile	Frequency	Sum of category ranks
1	11111	48	5
34	11121	6	6
52	21111	1	6
19	11122	1	7
72	12211	1	7
37	12121	1	7
2	11222	3	8
86	21221	1	8
12	12212	1	8
31	21122	2	8
94	22212	1	9
83	11142	1	9
78	21222	1	9
76	12411	1	9
56	31113	1	9
49	32112	1	9
53	22222	3	10
48	14122	1	10
100	14411	1	11
91	23222	1	11
79	14312	1	11
73	23321	1	11
97	32223	1	12
96	13422	1	12
84	14412	1	12
68	23322	1	12
85	24322	1	13
95	32432	1	14
90	13433	1	14
81	24332	1	14
70	44312	1	14
92	33333	1	15
89	33343	1	16
98	42434	1	17
93	24434	1	17
67	44333	1	17
99	44344	1	19
66	44444	5	20